REMARKS

This reply is submitted in response to the office action dated December 6, 2004. Claims 1-56 are pending. Claims 36-56 have been withdrawn. Claims 1, 2, 3, 4, 6, 8, 21, 25, 26, 28, and 29 have been amended. New claims 57, 58, 59, 60, 61, and 62 are added.

The amendments to claim 1 are supported by claims 6 & 14, and paragraph 63 on page 21.

The amendments to claims 2, 3, 4, 22, 23, and 24 correct grammatical errors.

The amendment to claim 6 is supported by paragraph 44 on page 13.

The amendment to claim 8 is supported by paragraph 45 on page 13.

The amendment to claim 9 corrects an obvious error.

The amendments to claims 14, 16, and 20 correct grammatical errors.

The amendments to claim 21 are supported by paragraph 79 on page 27 and paragraph 63 on page 21, claim 34, and page 13, paragraph 44, line 5.

The amendment to claim 25 is supported by paragraph 79 on page 27.

The amendment to claim 26 is supported by page 13, paragraph [0044] line 5.

The amendment to claim 28 is supported by paragraph 45 on page 13.

The amendments to claim 29 correct an obvious error and are supported by paragraph 47 on page 14.

The amendments to claims 34 and 35 correct grammatical errors.

New claims 57, 58, 59, 60, 61, and 62 are supported by paragraph 44 on page 13.

Restriction Requirement

Claim 1-56 have been subjected to a restriction requirement under 35 USC § 121 to two groups. They are: Group I: Drawn to a polyolefin composition, and Group II: drawn to a method of plasticizing a polyolefin. Applicant respectfully disagrees with the restriction requirement and submits that the Examiner must search class 524 for both Groups and that it is no greater burden to search for both inventions. Applicant respectfully requests that the restriction requirement be withdrawn. Applicant elects Group I claims 1-35, with traverse.

Objections

Claims 2, 3, 4, 14, 16,20, 22, 23, 24, and 34 and 35 have been amended to correct the grammatical errors as the Examiner suggests.

Claims 9 and 29 have been amended to delete the incorrect units as the Examiner suggests.

Applicant's claimed invention relates to a plasticized composition comprising a 60 to 99.9 wt% of a polyolefin(typically polypropylene or polybutene) and a 0.1 to 40 wt% of a non-functionalized plasticizer comprising C6 to C200 paraffins having a pour point less than -30°C and where elastomers are substantially absent from the composition and wherein the polyolefin is selected from propylene homopolymers, propylene copolymers, propylene impact copolymers, or mixtures thereof.

Rejections under 35 USC § 102(b) and 35 USC § 103(a) over Medsker

Claims 1, 2, 6, 7, 9-17, 19 and 20 are rejected under 35 USC § 102(b) as being anticipated by US 6,084,031 (Medsker). The Examiner suggests that compositions in Table 1 anticipate the claimed invention as Table1 (entry 1b and 1d) discloses blends containing, among other things, butyl rubber. Applicant notes that blends 1b an 1d do not actually contain butyl rubber (a copolymer of isobutylene and isoprene), rather they contain Copolymer A which is a methacrylate grafted copolymer of isobutylene and paramethylstyrene somewhat like butyl rubber (hence incorrectly called XP-50 Butyl Rubber in Medsker). Both polymers however are elastomers (also called a rubbers), not plastomers as the Examiner suggests. A "plastomer" is a polymer having both "plastic" and "elastomeric" properties, but not entirely being either a plastic or an elastomer. Neither butyl rubber nor the "XP-50" copolymer would be considered by one of ordinary skill in the art as a "plastomer." In fact, butyl rubber was one of the very first synthetic elastomers ever produced. As evidence to support this position please see, pages 284-285 of RUBBER TECHNOLOGY, 3rd edition, ed. Maurice Morton, Chapman and Hall New York, 1995 (copy enclosed) where butyl rubber is clearly referred to as an elastomer and its history from the 1930's is briefly explained.

The compositions in Medsker are different from Applicant's claimed invention. First, the claims, as amended, exclude elastomers and hence butyl rubber and the XP-50 copolymer are excluded from the claimed compositions. Second, the polyolefin in blends 1b and 1d (e.g. Polypropylenes A, B, and C) are not present at 60 to 99.9 wt% as required in claim 1. Therefore, Medsker's compositions containing butyl rubber or "XP-50 Butyl Rubber" and less than 60 wt% of polypropylene do not anticipate claims 1, 2, 6, 7, 9-17, 19 and 20. Applicant respectfully requests that the rejection be withdrawn.

Claims 5 and 8 are rejected under 35 USC § 103(a) as being unpatentable over Medsker. The Examiner suggests that the compositions in Medsker are essentially the same as applicant's and thus the Tg properties in claim 5 and the dielectric constant in claim 8 would be the same. Applicant respectfully disagrees and submits that compositions are not the same. Applicant claims a plasticized composition comprising a 60 to 99.9 wt% of a polyolefin(e.g. polypropylene) and a 0.1 to 40 wt% of a non-functionalized plasticizer comprising C6 to C200 paraffins having a pour point less than -30°C and where elastomers are substantially absent from the composition. In contrast Medsker discloses blends of predominantly an elastomer (XP-50 or butyl rubber) modified with various polypropylene copolymers and oil extended with polybutene. These blends are combined with curatives and made into dynamically vulcanized alloys where the plastic provides a thermoplastic matrix and the elastomer forms a dispersed phase of crosslinked rubber particles. Applicant's composition does not have elastomer present, particularly not present as dispersed beads of crosslinked particles. Furthermore the Parapol oil used in Medsker is there to oil extend the elastomer and make it easier to process. This means the oil migrates to the elastomer in the blend and is located with the elastomer. (It is generally believed in the art that the oil is attracted to the amorphous phase of the elastomer and repelled by the crystalline phase of the polypropylene). Thus, the oil in Medsker provides no "plasticizing" effect because it is not located in the plastic matrix. Therefore the Tg effect in claim 5 (i.e. the T_g of the polyolefin decreases from 4 to 10°C for every 4 wt% of non-functionalized plasticizer added to the composition, while the T_m remains within 1 to 2 °C) does not occur in Medsker's blends. In contrast, in Applicant's blends the oil is present in the polyolefin and thus has a plasticizing effect.

Nowhere within the four corners of Medsker is Applicant's specific plasticized composition disclosed or suggested. Further nowhere within Medsker is it suggested that a specific plasticizer having a pour point less than -30°C should be added to a polyolefin (e.g. polypropylene) to achieve a plasticizing effect. Likewise nothing within Medsker discloses or suggests that a specific plasticizer with a pour point of -30°C or less and a dielectric constant of less than 2.3 would have a plasticizing effect on a polyolefin such as polypropylene. Thus, Applicant respectfully submits that claims 5 and 8 are not obvious over Medsker and respectfully requests that the rejection be withdrawn.

Claims 21, 22, and 25-35 are rejected under 35 USC § 102(b) as anticipated by or, in the alternative, under 35 USC § 103(a) as obvious over Medsker. The Examiner repeats his suggestion that the compositions in Medsker are the same as Applicants and further suggests that they will exhibit the same properties. Applicant respectfully disagrees. As explained above, Medsker discloses dynamically vulcanized alloys of a polypropylene matrix with crosslinked particles of elastomer dispersed through out. This blend is significantly different from Applicant's. First, Applicant's blend has no elastomer. Second, Applicants blend has at least 60 weight % of the polyolefin (e.g. polypropylene), while Medsker's vulcanizates in Table 1 have less than 25 weight % of polypropylene. Third, the Parapol oil present in Medsker is present as an oil extending processing aid for the rubber and is located in the rubber, while Applicant's blend has no rubber for the plasticizer to segregate into. Thus, it is clear these blends are very different and will have very different properties. Consequently, the blends in Medsker do not anticipate the claimed invention. Further, nothing within the four corners of Medsker discloses or suggests the idea that combining a specific non-functionalized plasticizer compound having a pour point of -30°C or less with a polyolefin (e.g. polypropylene) will provide a plasticizing effect to the polypropylene which is generally thermoplastic in nature. An oil extended rubber is simply not the same thing as a plasticized plastic. Applicant respectfully submits that the claimed invention is not obvious from Medsker and requests that the rejection be withdrawn.

Rejections under 35 USC § 102(b) and 35 USC § 103(a) over Winseki

Claims 1, 2, 6, 9-12, 14, 16, 19 and 20 stand rejected under 35 USC § 102(b) as being anticipated by US patent 4,663,220 (Wisneski). The Examiner suggests that Wisneski discloses a composition comprised of 60 wt% Kraton G1652 and 40 wt % of Indopol L1-4. Kraton G 1652 is an elastomer at Table XIII. As discussed above Applicant's claimed invention excludes elastomers. Furthermore, Winseki's compositions in Table XIII lack 60 to 99.9 weight % of a polyolefin (such as polypropylene). Thus, Wisneski does not anticipate Applicant's claimed invention. Applicant respectfully requests that the rejection be withdrawn.

Claim 5 is rejected under 35 USC § 103(a) as being unpatentable over Wisneski. The Examiner suggests that the composition of Wisneski is the same as applicant's and thus will exhibit Applicant's claimed Tg effect. Applicant respectfully disagrees. First, there is no polyolefin (such as polypropylene or polybutene) in Wisneski's blends to have a Tg effect. Second, Kraton G is an elastomer, which are absent in Applicant's compositions. Third, the polybutene oil is dispersed within the Kraton as an oil extender and processing aid, not as a plasticizer. Further, nothing within the four corners of Medsker discloses or suggests the idea that combining a specific paraffinic compound having a pour point of -30°C or less with a polyolefin (such as polypropylene or polybutene) will provide a plasticizing effect to the polypropylene or polybutene which are generally thermoplastic in nature. An oil extended Kraton G is simply not the same thing as a plasticized plastic. Applicant respectfully submits that the claimed invention is not obvious from Medsker and requests that the rejection be withdrawn.

Claims 21, 22, 25-27, 29-32, 34, and 35 are rejected under 35 USC § 102(b) as anticipated by or in the alternative, under 35 USC § 103(a) as obvious over Wisneski. The Examiner repeats his suggestion that the compositions in Winseki are the same as Applicants and further suggests that they will exhibit the same properties. Applicant respectfully disagrees. As explained above, Winseki discloses blends comprising elastomers and the claimed invention does not comprise elastomers. Furthermore nothing

within Winseki discloses or suggests that combining a 0.1 to 40 wt% of a non-functionalized plasticizer comprising C6 to C200 paraffins having a pour point less than -30°C with 60 to 99.9 wt% of polypropylene where elastomers are substantially absent from the composition will produce a plasticized polypropylene composition. Thus Applicant respectfully request that the rejection be withdrawn.

Rejections under 35 USC § 102(b) and 35 USC § 103(a) over Nishio

Claims 1, 2, 7, 9-12, 14, 16-20 are rejected under 35 USC § 102(b) as being anticipated by US patent 6,001,455 (Nishio). The Examiner suggests that Nishio discloses a composition comprised of 100 "pw" of polyolefin and 32 wt% of paraffin oil having an Mw of 746 (Diana Process Oil PW-380). The Examiner states that the polyolefin comprises 36 wt% polypropylene, 36 weight % of a propylene-ethylene copolymer rubber and 28 wt% of an EPDM Rubber. Applicant respectfully disagrees and submits that claim 1 requires the non-functionalized plasticizer to have a pour point less than -30°C. The Examiner states that the Diana process oil has a pour point of -15°C. Thus the composition in Nishio does not anticipate the claimed invention. Further EPDM is a rubber. Those of ordinary skill in the art regard regards EPDM as a rubber. Nishio even refers to EPDM as a rubber. Rubber and elastomer are synonymous terms. Therefore the EPDM's in Nishio are excluded from Applicant's claims. Hence, the composition in Nishio does not anticipate the claimed invention. Applicant respectfully requests that the rejection be withdrawn.

Claim 5 is rejected under 35 USC § 103(a) as being unpatentable over Nishio. The Examiner suggests that the composition of Nishio is the same as Applicant's and thus will exhibit Applicant's claimed Tg effect. Applicant respectfully disagrees. First, EPDM is an elastomer, which are absent in Applicant's compositions. Second, the Diana Process Oil has a pour point of -15°C, which is above the -30°C limit in Applicant's claim1, which claim 5 is dependent on. Third, the Diane Process Oil is just that …a *process* oil. It is there to aid in processing, particularly since an elastomer (e.g. the EPDM Rubber) is included in the blend. The process oil will segregate into the

amorphous phase of the rubber and not to the polypropylene. Further, nothing within the four corners of Nishio discloses or suggests the idea that combining a specific paraffinic compound having a pour point of -30°C or less with a polypropylene will provide a plasticizing effect to the polypropylene which is generally thermoplastic in nature. Applicant respectfully submits that the claimed invention is not obvious from Medsker and requests that the rejection be withdrawn.

Rejections under 35 USC § 102(b) and 35 USC § 103(a) over Nishio in view of Stadtmiller

Claims 3 and 4 are rejected under 35 USC § 103(a) as being unpatentable over Nishio in view of US patent 4,592,851 (Stadtmiller). The Examiner suggests that Stadtmiller discloses that paraffinic oils are composed of straight or branched paraffinic hydrocarbons (at column 2, line26-28), and thus the oil in Nishio also contains straight n-paraffins and isoparaffins in the ranges claimed in claims 3 and 4. Applicant respectfully disagrees and notes that Stadtmiller is directed to *lubricating compositions,* an art area very different from polymer blends. Further Stadmiller at column 2, line 26- 29 states the "base oil used in the lubricating oil composition of this invention is generally a paraffinic mineral oil and is largely comprised of paraffin hydrocarbons, either straight or branched chain, and cycloparaffins or naphthene." This is not a definition. This is a statement by Stadtmiller about what kinds of bases oils can be used in his invention of hydraulic lubricating oils. It is entirely inappropriate to lift this text out of context, treat it as a definition, and use it to conclude that Nishio's Diana Process Oil PW-380 must have straight and branched paraffins. Only with the forbidden tool of hindsight could one look to statements about what bases oils are used in a hydraulic lubricating oil to infer the composition of a rubber processing aid. Even if one were to look to Stadtmiller, his base oils have pour points of -20 to 20 °F. (-28.89 to -6.76 °C) which fall outside Applicant's claims. Thus, it is inappropriate to combine Nishio with Stadtmiller because one is a polymer blend and the other is a hydraulic lubricating oil composition, but even if you do, the combination does not produce Applicant's claimed invention, because, among other things, Stadtmiller's lubricating oils do not fall within the claims.

Further Rejections under 35 USC § 102(b) and 35 USC § 103(a) over Nishio

Claims 21, 22, 25-27, 29-32, 34, and 35 are rejected under 35 USC § 102(b) as anticipated by, or in the alternative, as obvious over Nishio. The Examiner repeats his suggestion that the compositions in Nishio are the same as Applicant's and further suggests that they will exhibit the same properties. Applicant respectfully disagrees. As explained above, claim 1 requires the non-functionalized plasticizer to have a pour point less than -30°C. The Examiner states that the Diana Process Oil has a pour point of -15°C. Thus the composition in Nishio does not anticipate the claimed invention. Further EPDM is a rubber. Those of ordinary skill in the art regard EPDM as a rubber. Nishio even refers to EPDM as a rubber. Rubber and elastomer are synonymous terms. Therefore the EPDM's in Nishio are excluded from Applicant's claims. Thus Nishio does not anticipate Applicant's claimed invention. Furthermore, nothing within Nishio discloses or suggests that compositions that exclude rubbers and include certain non-functional plasticizers having a pour point below -30°C will produce plasticized polypropylene compositions. Thus Nishio does not make Applicant's clamed invention obvious. Applicant respectfully requests that the rejection be withdrawn.

Further Rejections under 35 USC § 102(b) and 35 USC § 103(a) over Nishio in view of Stadtmiller

Claims 23 and 24 are rejected under 35 USC § 103(a) as unpatentable over Nishio in further view of Stadtmiller. The Examiner suggests that Stadtmiller discloses that paraffinic oils are composed of straight or branched paraffinic hydrocarbons (at column 2, line26-28), and thus the oil in Nishio also contains straight n-paraffins and isoparaffins in the ranges claimed in claims 23 and 24. Applicant respectfully disagrees and notes that Stadtmiller is directed to *lubricating compositions,* an art area very different from polymer blends. Further Stadmiller at column 2, line 26- 29 states the "base oil used in the lubricating oil composition of this invention is generally a paraffinic mineral oil and is largely comprised of paraffin hydrocarbons, either straight or branched chain, and

cycloparaffins or naphthene." This is not a definition. This is a statement by Stadtmiller about what kinds of bases oils can be used in his invention of hydraulic lubricating oils. It is entirely inappropriate to lift this text out of context, treat it as a definition, and use it to conclude that Nishio's Diana Process Oil PW 380 must have straight and branched paraffins. Only with the forbidden tool of hindsight could one look to statements about what base oils are used in a hydraulic lubricating oil to infer the composition of a rubber processing aid. Even if one were to look to Stadtmiller, his base oils have pour points of -20 to 20 °F. (-28.89 to -6.76 °C) which fall outside Applicant's claims. Thus, it is inappropriate to combine Nishio with Stadtmiller because one is a polymer blend and the other is a hydraulic lubricating oil composition, but even if you do, the combination does not produce Applicant's claimed invention, because, among other things, Stadtmiller's lubricating oils do not fall within the claims.

Rejections under 35 USC § 102(b) over Maehara

Claims 1, 2, 7, 9-12, 14, 16, and 19 are rejected under 35 USC § 102(b) as being anticipated by US patent 4,703,078 (Maehara). The Examiner suggests that Maehara discloses polyolefin-based resin composition comprised of 100 pw of a polyolefin based resin selected from ethylene and or propylene (co)polymers, 20-300 pw of a wax, and 20-300 pw of an oily fluid having a pour point of 25°C or less (the Examiner suggests that representative oils are Diana Process Oil with a pour point of -15°C and Idemetsu's Polybutene 15R having a pour point of -15°C). Applicant respectfully disagrees and submits that Maehara discloses a soft sculpting compound made of PE or PP, wax and oil, specifically examples 21 and 22 use Diana Process Oil PW-380, polypropylene and a PE polymer (Mn 2000, Tm 90°C) to make a soft sculpting compound. The Diana Process Oil PW-380 does not have a pour point below -30°C as required by Applicant's claims. Thus, Maehara does not anticipate the claimed invention. Applicant respectfully requests that the rejection be withdrawn.

Applicant respectfully submits that the claims are in condition for allowance and respectfully requests notice of such.

The Commissioner is hereby authorized to charge any additional fees which may be required by this paper, or credit any overpayment, to Deposit Account Number 05-1712.

Respectfully submitted,

April 6, 2005
Date

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10

BUTYL AND HALOBUTYL RUBBERS

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INTRODUCTION

Butyl rubber, introduced in 1942, is commercially produced by cationically copolymerizing isobutylene with small amounts of isoprene. The halogen derivatives, chloro- and bromo-, were introduced in the early 1960's and have been commercially available since then. The halogenated derivatives of butyl rubber provide greater vulcanization flexibility and enhanced cure compatibility with other, more unsaturated general-purpose elastomers. Butyl polymers are among the most widely used synthetic elastomers in the world, ranking third in total synthetic elastomers consumed. As speciality elastomers, the butyl-based polymers have found their most important application in the tire industry although a host of other applications have evolved and continue to utilize their unique properties. There are two producers in the free world: Exxon Chemical Company, an affiliate of Exxon Corporation; and Polysar, Ltd., of Canada. The polymer is also produced in the USSR for internal consumption.

BUTYL RUBBER

Commercial butyl-rubber grades poly(methylpropene-co-2-methyl-1,3 butadiene) or poly(isobutylene-co-isoprene), are prepared by copolymerizing small amounts of isoprene, 1 to 3% of the monomer feed, with isobutylene, catalyzed by $AlCl_3$ dissolved in methyl chloride. The extremely rapid reaction is unique, proceeding via cationic polymerization at $-100°C$ to completion in less than a second. Monomer purity is important to achieve the desired polymer molecular weights. The methyl chloride diluent and monomer feed must be carefully dried.

Historical

Butyl rubber had its origin in the work of the researchers, Gorianov and Butlerov (1870) and Otto (1927), who found that oily homopolymers of isobutylene

could be produced in the presence of boron trifluoride. It wasn't until the 1930's that the I. G. Farben Company of Germany produced high-molecular-weight polyisobutylenes that possessed rubber-like properties but could not be vulcanized by normal methods because of their saturated hydrocarbon structure. These homopolymers are available today in a variety of molecular weights from Badischer of Germany and Exxon Chemical Company under the trade names OPPANOL® and VISTANEX®, respectively. Their unique age-resistant properties have made them particularly suitable for uncured rubber sheeting, caulks and sealants, adhesives and chewing gum.

Subsequent research in the 1930's led W. J. Sparks and R. M. Thomas[1-5] of Exxon Research and Engineering Company (then known as the Standard Oil Development Company) to advance the state of the art of isobutylene polymerization, and in 1937 produced the first vulcanizable isobutylene-based elastomer by incorporating small amounts of a diolefin, and particularly isoprene, into the polymer molecule. This introduced the first concept of limited olefinic functionality for vulcanization in an otherwise saturated copolymer. Corresponding vulcanizates of these new copolymers (now known as "butyl rubber") were found to possess a set of unique and desirable properties, e.g., low gas-permeability, high hysteresis, outstanding resistance to heat, ozone, chemical attack and tearing. Subsequent development to commercialization was spurred during World War II by the U.S. Government as part of its rubber-procurement program. Exxon built and operated the first butyl commercial facility in cooperation with the Government's Rubber Reserve Board. In 1955, the commercial butyl plants were purchased by Exxon Chemical from the U.S. Government.

Butyl-rubber Manufacture

A schematic diagram of a typical butyl plant is shown in Fig. 10.1. The feed, which is a 25% solution of isobutylene (97–98%) and isoprene (2–3%) in methyl chloride, which is the diluent, is cooled to −100°C in a feed tank. At the same time, aluminum chloride is also being dissolved in methyl chloride. Both of these streams are then continuously injected into the reactor. Because the reaction is exothermic and is practically instantaneous, cooling is very important. To remove the heat of reaction, liquid ethylene is boiled continuously through the reactor cooling coils, keeping the reaction at −100°C. As the polymerization proceeds, a slurry of very small particles is formed in the reactor. This slurry overflows into a flash drum that contains copious quantities of hot water. Here the mixture is vigorously agitated, during which time the diluent and unreacted hydrocarbons are flashed off overhead.

At this point, an antioxidant and zinc stearate are introduced into the polymer. The antioxidant is added to prevent breakdown of the polymer in the subsequent finishing section. Zinc stearate is added to prevent the agglomeration,